

REMARKS

Entry of the above amendments and reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 1-23 and 28-30 as being unpatentable under 35 USC 103(a) over Eisenhart et al in view of Lau et al is again traversed.

Applicant's invention is directed primarily to a composition comprising a hydrophobically modified polyacetal polyether or comb hydrophobically modified polyacetal polyether and a cyclodextrin viscosity-suppressing agent. Applicant has now amended his claims to clearly state that the polymer content of the claimed composition is greater than 10 wt %.

Neither Eisenhart et al. nor Lau et al. discloses a method of using a viscosity-suppressing agent to suppress the solution viscosity of a hydrophobically modified polyacetal-polyether or comb hydrophobically modified polyacetal-polyether. It should be noted that the HM-PAPes were unknown when the Eisenhart and Lau references were granted in 1992 and 1994, respectively. HM-PAPes of the instant invention are novel materials that were patented in US Patents 5,137,571 and 5,376,709. The Eisenhart and Lau Patents describe the use of cyclodextrin or cyclodextrin derivatives to lower the solution viscosity specifically of hydrophobically modified polyethoxylated urethane, hydrophobically modified alkali soluble emulsions, hydrophobically modified hydroxethylcellulose, and hydrophobically modified polyacrylamides. From a scientific standpoint, the efficacy of a given cyclodextrin to lower the solution viscosity of a given hydrophobically modified polymer depends on several factors. These factors include: a) type of polymer backbone, b) polymer chain length or molecular weight, c) molar mass and the amount of the hydrophobe, d) rigidity and location of the hydrophobe on the polymer backbone, and e) the size and water-solubility of a given cyclodextrin.

It is described in the Eisenhart reference (US 5,137,571) in column 5, lines 5-35 that unmodified beta-cyclodextrins were not effective viscosity suppressants to lower the 20% solids solution of hydrophobically modified polyethoxylated urethanes. Since unmodified cyclodextrins, particularly beta-cyclodextrin, have limited water-solubility, they were not effective viscosity suppressants for hydrophobically modified polyethoxylated urethanes (HM-PU). Based on this teaching, someone skilled in the art would have concluded that beta-cyclodextrin cannot be used at all to lower the solution viscosity of high solids (greater than 20%) solutions of hydrophobically modified polymers. In the present invention, this statement was found to be invalid as the applicant was able to substantially suppress the high solids (greater than 20%) solution viscosity of the novel hydrophobically modified polyacetal-polyethers using beta-cyclodextrin. In fact, applicant was surprised to find that beta-cyclodextrin and its derivatives could be used to suppress the solution viscosity of high solids (greater than 20%) solutions of HM-PAPEs that have molecular weight comparable to that of the HM-PU described in Eisenhart (US 5,137,571) and Lau (US 5,376,709). This difference in solution viscosity behavior between HM-PU and HM-PAPEs is due to their difference in chemical structure. Note that HM-PU claimed in the Eisenhart and Lau Patents have hydrophobes as part of the polymer backbone. They also possess urethane linkages, which can undergo hydrogen bonding with cyclodextrins. By contrast, HM-PAPEs do not have hydrophobes in their backbone and they do not contain urethane linkages. They either have terminal hydrophobes or pendent hydrophobes. This structural feature of HM-PAPEs distinguishes them from other hydrophobically modified water-soluble polymers. The present invention clearly demonstrates that the complexing behavior of cyclodextrins with HM-PAPEs is different from that of HM-PU.

In order to further illustrate the differences between Eisenhart and the instant application, the differences can readily be seen from Table 6 in column 9 of Eisenhart in Examples 35 and 42 where 1.5 grams of the beta-cyclodextrin

was used for a 20 % solids solution of the HM-PU ("QR-708") as compared with applicant's Table 2 of Example 3 on page 11 of the instant application. This is a direct comparison of the solution viscosity of 20% solids solution of the two chemically different classes of hydrophobically modified polymers in conjunction with the same level of beta-cyclodextrin. The applicant got a much lower and workable viscosity. This Table 6 of Eisenhart clearly demonstrates that even at level as low as 7.5 % solids, the solution viscosity of HM-PU is high (see samples 38 and 39) where the viscosity for both samples is 4,750 cps. This clearly supports Eisenhart's position that he cannot use unmodified cyclodextrins to make high solids solutions of HM-PU having a workable viscosity.

Hence, based on the teachings of the Eisenhart and Lau patents, one skilled in the art could not have predicted the efficacy and utility of cyclodextrins to lower solution viscosity of HM-PAPEs.


It must also be reiterated that the hydrophobically modified polymers disclosed in the Eisenhart and Lau patents are basically urethanes, which would not suggest to a person skilled in art that these polymers could be substituted for HM-PAPE because as noted above HM-PAPEs have a different chemical and physical structure than the polymers of Eisenhart and Lau. The polymers of Eisenhart have a substantially different backbone structure as described in column 1, in lines 59 to 62 where these polymers of US Patent Nos 4,155,892 and 4,079,028 were used in the preparation of the Examples of the Eisenhart patent disclose that the polyurethane thickeners are characterized by having at least 3 hydrophobic groups in the molecule where at least one hydrophobe has to be in the backbone. In addition, the polyurethane thickeners of Eisenhart have urethane linkages which can undergo hydrogen-bonding with cyclodextrin. If the cyclodextrin gets bonded to the urethane linkage, then it would not be an efficient viscosity suppressant.

All of the other classes of the polymers used in Eisenhart (i.e., hydrophobically modified alkali soluble emulsions, hydrophobically modified hydroxyethylcellulose, and hydrophobically modified polyacrylamides) are high molecular weight polymers and because of their high molecular weight solid solutions of more than 5 wt % concentration with a workable viscosity cannot be made using cyclodextrins. Example 7 of Eisenhart gives examples of suppressing the viscosity of such high molecular weight polymers only up to 3 % solids. Above this amount, the high solids solution viscosity of these polymers would be very high making them unsuitable for handling.

Hence, it would not be obvious to a person having an ordinary skill in the art armed with these prior art references to practice applicant's invention. Assuming arguendo that the combination suggested by the Examiner could be made, such a combination still would not read on applicant's invention.

Hence, for the reasons set forth above, it is submitted that this application is now in the condition for allowance and prompt notification thereof is respectfully requested.

Respectfully submitted,



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